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DEMANDS OF PRACTICE AND FURTHER EDUCATION OF VOCATIONAL TRAINING TEACHERS

Demands of practice in context of EU strategy priorities

Based on the demands of practice the EU strategy for the period of the on-coming years until the year 2020 identifies three main priorities which are:

- intelligent growth,
- sustainable growth,
- inclusion growth.

To ensure the *intelligent growth* means to create a knowledge and innovation based economy. To ensure the *intelligent growth* means to create a more ecological competitive industry utilizing all resources at the most efficient ways. And finally to ensure the *inclusion growth* means to reach a high level of the employment rate which will guarantee both social and regional consistence. To main preconditions of the above-mentioned belongs development of new production technologies, creation of new approaches to material processing, promotion of applied research in all industry branches but mainly an adequate preparation of qualified human resources as people are the key factor in whichever economy development.

Demands of practice in the context of Slovak industry

Due to the flow of the foreign capital in automotive industry Slovakia has become one of the leading car producers in Central Europe. Currently there are three important world car producers operating in Slovakia. These are *Volkswagen Slovakia* in Bratislava, *PSA Peugeot Citroën Slovakia* in Trnava and *Kia Motors Slovakia* in Žilina.

In the year 2010 the automotive industry proportion within the Slovak industry was 37%. This was 0,8% less compared with the year 2009. But as to the total number of the produced cars, in 2010 their number was 562 thousands, what meant 21% interannual increase of the production. In the year 2011 one expects 630 thousands cars produced in Slovakia and in the period of one or two years the production could overreach 900 thousand limit.

The high proportion of the automotive industry within the Slovak economy creates a high demand for relevantly qualified workers on labour market. In 2010 the automotive industry employed 69,8 thousand employees and in the year 2011 the number of employees in the automotive industry should reach 75 thousand limit.

An overview of the car production (in pieces) per year together with the numbers of employees working in the automotive industry in years 2001 – 2011 is presented in the table 1.

Table 1 Numbers of the produced cars and people employed in the automotive industry in Slovakia in years 2001 – 2011

| Year | Car production | Number of employees |
|-------------|-----------------------|----------------------------|
| 2001 | 182 000 | 45 000 |
| 2002 | 225 000 | 50 000 |
| 2003 | 281 000 | 54 000 |
| 2004 | 223 000 | 55 000 |
| 2005 | 218 000 | 57 000 |
| 2006 | 295 000 | 67 000 |
| 2007 | 571 000 | 77 000 |
| 2008 | 576 000 | 74 000 |
| 2009 | 461 000 | 68 000 |
| 2010 | 556 000 | 70 000 |
| 2011 | 630 000* | 75 000* |

*expected numbers

In connection with the need to cover demands of the labour market for man-powers for the automotive industry two principal problems are occurring. One problem is a lack of interest in technical study programmes at both secondary schools and universities. And the other problem is the content of these study programmes which does not reflect demands of practice and employers` requirements. Actually the automotive industry urges on a bad situation in the system of secondary schools in general. For example in 2009 the number of secondary school graduates reached almost 50 thousand but more than 13 thousand of them, i.e. more than one quarter, did not find employment and have stayed unemployed, and more than 29 thousand, i.e. more than 60 %, have employed in other fields than those which they studied and have been prepared for. These numbers show that never two of ten graduates are employed in a branch related to their previous study specialization.

As to the problem of the content of study programmes (curricula problem) the current practice shows that technical knowledge in general is becoming out of date in 10 years and in connection with automotive industry it is even less because innovation cycles in this branch are extremely short.

The Ministry of education, science, research and sport of the Slovak Republic reacts on the described situation and tries to find some solutions. In co-operation with the Automotive Industry Association of SR* it decided to create a new system of study fields

* *Automotive Industry Association of the Slovak Republic* (www.zapsr.sk) is a voluntary association of legal entities operating in five basic fields:

- superstructures for motor and trailing vehicles, accessories for motor and trailing vehicles;

for motor vehicle mechanics and motor vehicle technicians to improve technological readiness of the new automotive industry staff adequately. To improve the graduates' profiles also changes in curricula are supported and introducing. In this connection the ministry has funded a national project *Creation of new educational programmes in vocational training for requirements of the automotive industry*.

Solutions to the above-mentioned two problems establish a platform for fulfilment of actual demands of labour market and employers. But anyway better these solutions will be, the key factor of their fruitfulness are teachers, mainly vocational training teachers with their continuously up-grading technological readiness.

Demands on further education of vocational training teachers

As it has been already mentioned, currently technical knowledge is becoming out of date approximately in 10 years and related to automotive industry it is even less. There are developed still newer and newer modern automobiles, motor vehicle technologies and their production engineering are still innovated and the innovation cycles are becoming still shorter and shorter. This reality has to be reflected in up-to-date study programmes, i.e. it has to be reflected in professions and specializations offered by secondary schools and universities to study and it has to be reflected in the curricula of the study programmes, too. Curricula have to be permanently adapted to the latest needs of the industry, and schools have to establish a close co-operation with the industry. But to give an adequate education and training to students requires having teachers and trainers disposing of adequate professional knowledge and skills. From this point of view mainly further (continual) education of vocational training teachers is becoming more and more serious issue. The reason is the fact that these teachers (trainers, supervisors of vocational training) are acting more or less out of the real practice and so as technologies in practice are becoming out of date their professional knowledge does, too. It is useless to teach students how a carburettor operates, if carburettors are no longer used in cars. So the problem is not only to design appropriate curricula but it is necessary also to keep the teachers in contact with actual happenings of practice and to supply teachers with adequate latest knowledge, i.e. to teach or train them what they are supposed to teach or train their students.

Innovation of the study branch *Mechanic of Motor Vehicle*

Secondary schools can use the EU Structural Funds to solve various problems. As an example of a project contributing to creation of solutions of the discussed issues can serve the project *Innovation and modernisation of the study branch Mechanic of Motor Vehicle* which is carried out by the Secondary Vocational School in Senec.

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- research, development, manufacturing and sale of motor and trailing vehicles, their components;
 - design and manufacturing of tools and equipment for automotive and allied industries;
 - import and sale of motor vehicles;
 - technical university education of specialists for automotive, allied and supplying industries as well as for service and vehicle operating.

The Secondary Vocational School in Senec is a public school constituted in 2002 following integration of two secondary schools – Engineering Apprentice School and Secondary School of Business Enterprise. Currently the school employs 40 teachers and is attended by 300 students.

In 2004 the school was chosen to serve as a *Pilot Centre of the Automotive Industry Association of the Slovak Republic* for professional education and training of qualified specialists in the area of sale and service of motor vehicles. Within the established Pilot Centre students are trained both in school facilities (workrooms equipped with diagnostic and service technologies) and branded service stations in study programme *Car Mechanic* in one of four specializations: *mechanician, electrician, coachbuilder, lacquerer*.

The school has participated at several international projects and currently it is solving a European Social Fund project entitled *Innovation and modernisation of the study branch Mechanic of Motor Vehicle* (Operational Program Education, Modern education for knowledge society; duration of the project: 2009–2011). This project is an example of good practice how to cope with the issue of permanent curricula modification and further education of vocational training teachers.

The main goal of the project is to innovate both content and teaching methods in the study field *Mechanic of Motor Vehicles* to achieve a better employment of its graduates on the labour market. Fulfilment of this goal is conditional on complying of two other specific goals. One of them is to develop an innovative school educational programme for the study field *Mechanic of Motor Vehicles*. The second one is to increase quality of the life-long continual education for teachers teaching the study field *Mechanic of Motor Vehicles*.

Three project activities are related to the first specific goal and these are:

1. To develop basic documentation including the school education programme for a new study specialization/branch 2487 2 *Mechanic of Motor Vehicles* 05 *Mechanic of single-trace vehicles*. (There is no study specialization directed on single-trace vehicles in the network of the secondary schools in Slovakia. The nearest schools to Slovakia offering education and training of mechanics in this specialization are BS KFT – Berufsschule für Kraftfahrzeugtechnik Siegfried Marcus Berufsschule in Vienna, Austria, and Joint Secondary Automotive School in Brno, Czech Republic).
2. To create worksheets for all four specializations/branches of the study field 2487 22487 2 *Mechanic of Motor Vehicles*, i.e.
 - for the study specialization/branch 2487 2 01 *Mechanic of Motor Vehicles* – *Mechanician* worksheets *Automobiles, Automobile diagnostic and repair, Electrical Engineering*,
 - for the study specialization/branch 2487 2 02 *Mechanic of Motor Vehicles* – *Electrician* worksheets *Automobiles, Automobile diagnostic and repair, Electronics, Electrical measurement, Electroaccessories*,
 - for the study specialization/branch 2487 2 03 *Mechanic of Motor Vehicles* – *Coachbuilder* worksheets *Automobiles, Automobile diagnostic and repair, Electrical Engineering, Plumber technology, Material science*,

- for the study specialization/branch 2487 2 04 *Mechanic of Motor Vehicles*
 - *Lacquerer* worksheets *Automobiles*, *Lacquer technology*, *Lacquer materials*, *Technical drawing*.
- 3. To create worksheets *German language* and *English language* directed on automobile repair terminology.

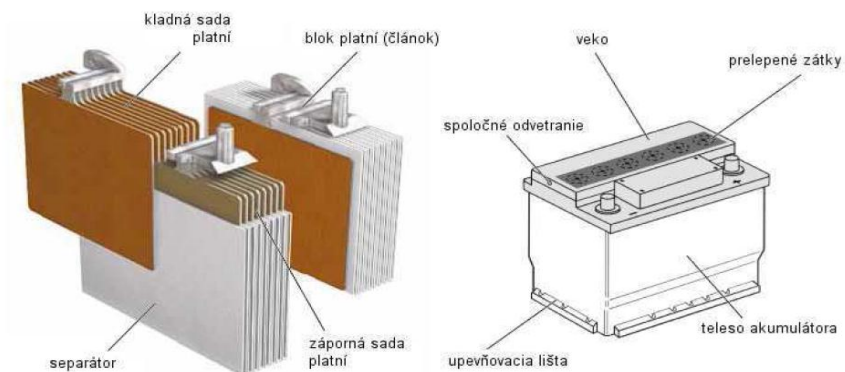
Realisation of a further education of teachers and professional training supervisors is related to the second specific goal. The realisation of the further education of teachers and professional training supervisors in the Secondary vocational school in Senec is based largely on the co-operation with [CPA SR](#) and representatives of the secondary school graduates employers (i.e. employers of the graduates of the study field *Mechanic of Motor Vehicles*), and partially on the use of the created worksheets. Content of the further education consists of 16 modules (1 module = 30 lessons):

1. Electrotechnics of motor vehicles I (electrical parts)
2. Electrotechnics of motor vehicles II (electronic systems)
3. Carriages of motor vehicles I (car and motorcycle chassis parts)
4. Carriages of motor vehicles II (electronics motor vehicle carriages)
5. Brakes of motor vehicles I (braking theory, mechanical brake systems)
6. Brakes of motor vehicles II (electronic brake systems)
7. Gearings of motor vehicles I (clutches, manual gearboxes)
8. Gearings of motor vehicles II (automated gearboxes)
9. Gearings of motor vehicles III (robotized gearboxes, variators, drive theories)
10. Engines of motor vehicles I (mechanical parts of car and motorcycle combustion engines)
11. Engines of motor vehicles II (internal and external mixture formation, fuel injection)
12. Motor vehicle comfort electronic (air conditioning, motor vehicle active and passive safety)
13. Complex diagnostic of motor vehicles (modern diagnostic technology in car services)
14. Coachbuilder technology (modern planishing systems, body reparation technologies)
15. Lacquerer technologies (modern systems for body varnishing)
16. Lacquer materials (modern lacquer material properties and applications)

Examples of the worksheets

A worksheet from German language aimed at car repair terminology

Das Arbeitsblatt Nr. 1



Ergänze den Text:

_____ ist die Quelle des _____. Er ändert den
_____ Strom an den _____ und umgekehrt.
Der Akkumulator besteht aus einzelnen _____, aus einem
_____ von _____ und einem Satz von
_____. Die Bleisätze bestehen aus einem _____ und
aktiver _____ und sie werden durch die Separatore aus dem
_____ getrennt. Die Zellen liegen im _____.

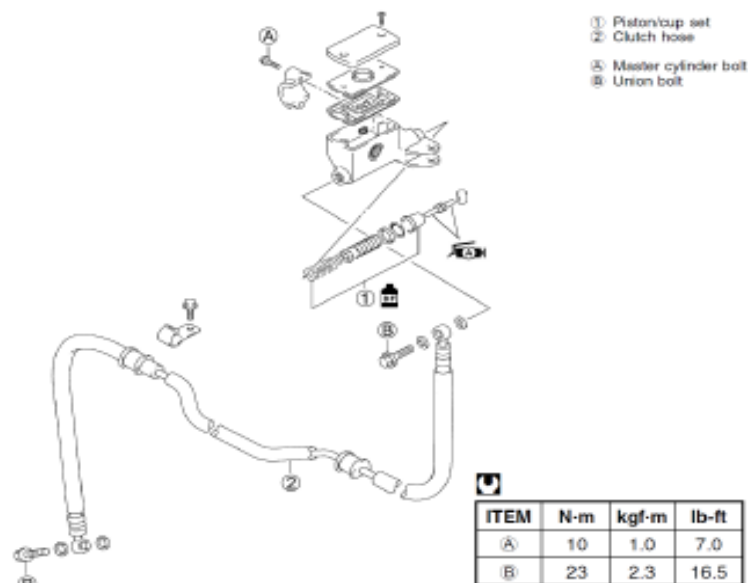
Fragen:

Was ist der Akkumulator?
Welche Aufgabe erfüllt er?
Woraus besteht er?

THE MASTER BRAKING CYLINDER

In motorcycles are used one and two circuit brakes. The two circuit controlling system demands the two circuit master braking cylinder with two separated working spaces and the pistons. In most cases is used master tandem braking cylinder. These are both working spaces arranged behind themselves in the common axis.

One circuit master braking cylinder of motorcycle



Picture: One circuit controlling front brakes of motorcycle

Exercise: 1. Read the text and find the adjectives, then write down them

2. Match these words together:
- | | |
|------------|---------------|
| Piston/cup | Cylinder bolt |
| Union | Hose |
| Master | Set |
| Clutch | Bolt |

3. Translate the text and check your vocabulary in a dictionary

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